

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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For : RUBBER COMPOSITION AND TIRES MADE BY USING
THE SAME

Art Unit & Examiner : 1762, Ms. Vickey Nerangis

DECLARATION UNDER 37 CFR 1.132

HONORABLE COMMISSIONER FOR PATENTS

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Sir:

I, Noriaki YUKIMURA, in care of 3-1-1, Ogawahigashi-cho Kodaira-shi,
Tokyo, Japan, declare that:

1. I graduated from The University of Tokyo in doctor's course of Graduate School of Science majoring chemistry in March 2007, and joined BRIDGESTONE CORPORATION in April 2007. Then, I have been engaged in the research and development of compounding ingredients for rubber compositions in Tire-Material-Development Department up to the present.

2. I am familiar with the subject matter disclosed in the application.

3. Experiment

Object of Experiment

In order to show unexpected results reasonably commensurate in scope with the scope of the claims, additional experiments were conducted.

Procedure of the Experiment

Each of the silane compounds of Additional Examples 1 to 8 was prepared in accordance with the same procedures as those conducted in Synthesis Example 5 of this invention except that the same mol of alkylene dichloride corresponding the carbon number of R⁶ and R⁷ was used in place of 1,6-dichloro-hexane used in Synthesis Example 5.

Each of the silane compounds of Additional Examples 9 to 24 was prepared in accordance with the same procedures as those conducted in Synthesis Example 11 of this invention except that the same mols of chlorine-containing silane compound and alkylene dichloride corresponding the carbon number of R⁸, R⁹ or R¹⁰ were used in place of the chlorine-containing silane compound and 1,6-dichloro-hexane used in Synthesis Example 11.

The compounding recipes except for the silane compounds are the same as Example 1 of this invention described in the specification.

These experiments were conducted by the equimolar amounts of the silane compounds.

Test Methods

The evaluation items and the test methods are the same as those described in the specification of this invention.

Result

The results obtained are shown in the following Tables A, B and C.

Table A

	Additional Examples								Comparative Example 2
	1	2	3	4	5	6	7	8	
Silane Compound represented by average structural formula (I) and general formula (III)									
R ⁶ and R ⁷	methylene	n-butylene	hexylene	octylene	decylene	tetradecylene	hexadecylene	icosylene	Si75
Number of carbon atoms of R ⁶ and R ⁷	1	4	6	8	10	14	16	20	
R ¹	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	
p	0	0	0	0	0	0	0	0	
m	1	1	1	1	1	1	1	1	
x	2	2	2	2	2	2	2	2	
Molecular weight	567.49	651.49	707.28	763.49	819.49	931.49	987.49	1099.49	
Purity(%)	86	85.8	85.7	85.4	85.9	85.2	86	85.8	
Amount (phr)	5.8	6.6	7.2	7.8	8.4	9.5	10	11.2	
Molar Amount ratio	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	
Mooney viscosity	107	105	104	102	100	100	99	98	
Resilience	111	112	112	112	111	111	112	112	
Abrasion resistance	112	110	109	110	110	110	111	110	

Table B

	Additional Examples								Comparative Example 2
	9	10	11	12	13	14	15	16	
Silane Compound represented by average structural formula (I) and general formula (IV) in which both of R ⁸ and R ¹⁰ have 6 carbon atoms.									
R ⁹	methylene	n-butylene	hexylene	octylene	decylene	tetradecylene	hexadecylene	icosylene	S175
Number of carbon atoms of R ⁹	1	4	6	8	10	14	16	20	
R ¹	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	
p	0	0	0	0	0	0	0	0	
m	1	1	1	1	1	1	1	1	
y and z	2	2	2	2	2	2	2	2	
Molecular weight	679.49	763.49	855.57	875.49	931.49	931.49	987.49	1099.49	
Purity(%)	86.1	85.8	85.5	85.7	85.6	85.8	85.4	85.9	
Amount (phr)	6.9	7.8	8.7	8.9	9.5	9.5	10	11.2	
Molar Amount ratio	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	
Mooney viscosity	105	104	103	103	101	101	99	99	
Resilience	113	112	111	111	110	111	112	113	
Abrasion resistance	111	109	108	108	108	107	108	107	

Table C

Additional Examples										Comparative Example 2
17	18	19	20	21	22	23	24			
Silane Compound represented by average structural formula (I) and general formula (IV) in which R ⁹ has 6 carbon atoms.										
R ⁸ and R ¹⁰	methylene	n-butylene	hexylene	octylene	decylene	tetradecylene	hexadecylene	icosylene	Si75	
Number of carbon atoms of R ⁸ and R ¹⁰	1	4	6	8	10	14	16	20		
R ¹	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl	ethyl		
p	0	0	0	0	0	0	0	0		
m	1	1	1	1	1	1	1	1		
y and z	2	2	2	2	2	2	2	2		
Molecular weight	679.49	763.49	855.57	875.49	931.49	931.49	987.49	1099.49		
Purity(%)	86.0	85.6	85.5	85.9	85.8	85.5	85.6	85.9		
Amount (phr)	6.9	7.8	8.7	8.9	9.5	9.5	10	11.2		
Molar Amount ratio	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
Mooney viscosity	104	104	103	102	102	102	101	100		
Resilience	112	110	111	110	111	111	111	112		
Abrasion resistance	112	111	108	109	108	108	109	108		

4. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 2011. 1. 6

By: 幸村 憲明
Noriaki YUKIMURA